

Two New Species of Moonworts (*Botrychium* subg. *Botrychium*) from Alaska

MARY CLAY STENSVOLD

USDA Forest Service, Alaska Region, 204 Siginaka Way, Sitka AK 99835

DONALD R. FARRAR

Department of Botany, Iowa State University, Ames, IA 50011

CINDY JOHNSON-GROH

Department of Biology, Gustavus Adolphus College, St. Peter, MN 56082

ABSTRACT.—*Botrychium tunux* and *Botrychium yaaxudakeit*, new species of moonworts currently known only from southern Alaska, are described and illustrated. These ferns are distinguished from *B. lunaria*, with which they have been confused, by allozyme data and their morphological characteristics. Ploidy levels of *B. tunux* (diploid) and *B. yaaxudakeit* (tetraploid) are inferred from allozyme patterns. A key to Alaskan moonworts is presented.

Before 1995, little attention was paid to Alaskan moonworts, *Botrychium* subg. *Botrychium*. Information gained from rare plant surveys since then has improved our knowledge of moonwort abundance, distribution, and relationships. Seven species of moonworts are now known in southern Alaska: *Botrychium ascendens* W.H. Wagner, *B. lanceolatum* (S.G. Gmel.) Ångström, *B. lunaria* (L.) Sw., *B. minganense* Vict., *B. pinnatum* H. St. John, the new species *B. alaskense* W.H. Wagner & J. R. Grant, and two additional new species described here, *B. tunux* and *B. yaaxudakeit*.

During a 1980 USDA Forest Service rare plant survey, several *Botrychium* identified as *B. lunaria* (M. C. Muller 3806, ALA, TNFS) were collected in sandy upper beach meadows near Yakutat, in southeastern Alaska. In 1986, W. H. Wagner and F. S. Wagner (1986) described a new moonwort, *Botrychium ascendens*, and re-identified some of the 1980 specimens as *B. ascendens*; other specimens on the herbarium sheets remained *B. lunaria*. The inclusion of Alaska in the range of *B. ascendens* in Volume 2 of the Flora of North America (W. H. Wagner, 1993) was based on the 1980 Muller collection.

In July 1995, the Forest Service conducted rare plant surveys to re-locate the Yakutat *B. ascendens*. Specimens were collected at the 1980 site and elsewhere in the Yakutat area. These were sent to W. H. Wagner for identification. He determined that in 1995, only *B. minganense* was collected at the 1980 *B. ascendens* site, but felt that some of the other specimens collected in the Yakutat area might be an undescribed species. In a study of the Yakutat *Botrychiums* in 1996, David Wagner recognized two forms of *B. lunaria* and recommended further study. In 1997, the Forest Service sent assorted specimens of tentatively identified *B. lunaria* and other *Botrychium* specimens to D. R. Farrar, to be analyzed through starch gel enzyme electrophoresis.